

REMARKS AND DISCUSSION

Upon entry of the present Amendment, claims 1-7 are pending in the application, of which claim 1 is independent. Claim 1 has been amended herein. New claims 2-7 have been added herein.

The above-identified Office Action has been reviewed, the references carefully considered, and the Examiner's comments carefully weighed. In view thereof, the present Amendment is submitted. It is contended that by the present amendment, all bases of rejection set forth in the Office Action have been traversed and overcome. Accordingly, reconsideration and withdrawal of the rejection is respectfully requested.

Amendments Presented

The Abstract has been amended herein to remove the reference numbers therefrom, in order to comply with U.S. practice.

Claim 1 has been amended herein to make the claim more definite and to remove the reference numbers from the claim.

New dependent claims 2-7 define further aspects of the parking brake system, i.e., claim 2 further defines that the locking mechanism further comprises a spring provided in a compressed state between the casing and the lock piston so as to urge the lock piston forwardly; claim 3 further defines that the insertion shaft comprises a small diameter shaft portion and a large diameter shaft portion coaxially and integrally connected via a tapered portion that changes the contact position of each of the spheres from the smaller diameter shaft portion to the large diameter shaft portion in response to a forward movement of the lock piston; claim 4 further defines that the lock piston integrally includes a small diameter portion slidably fitted into the casing and a large diameter portion coaxially connected to a rear part of the small diameter portion while forming a forward facing annular step between the large diameter portion and a rear portion of the small diameter portion; claim 5 further defines that at

least one annular seal is mounted on an outer periphery of the small diameter portion of the lock piston and at least one annular seal is mounted on the outer periphery of the large diameter portion of the lock piston; claim 6 further defines that the annular seals seal a parking release control fluid pressure chamber from opposite sides in the axial direction; and claim 7 further defines that the casing bore includes a slide hole having a first diameter, which slidably receives a portion of the parking piston, and a guide hole coaxially connected to the slide hole and having a second diameter which is smaller than the first diameter, the guide hole configured to slidably receive the retaining tube therein, wherein a tapered, forward-facing restricting step is formed in the casing bore between the guide hole and the slide hole.

Applicant respectfully submits that all of such amendments are fully supported by the original disclosure, including the drawings. For example, the locking mechanism further comprising a spring provided in a compressed state between the casing and the lock piston so as to urge the lock piston forwardly is discussed at paragraph [0060] of the original specification. The insertion shaft comprising a small diameter shaft portion and a large diameter shaft portion coaxially and integrally connected via a tapered portion that changes the contact position of each of the spheres from the smaller diameter shaft portion to the large diameter shaft portion in response to a forward movement of the lock piston is discussed at paragraph [0082] of the original specification. The lock piston integrally including a small diameter portion slidably fitted into the casing and a large diameter portion coaxially connected to a rear part of the small diameter portion while forming a forward facing annular step between the large diameter portion and a rear portion of the small diameter portion is discussed at paragraph [0076] of the original specification. At least one annular seal being mounted on an outer periphery of the small diameter portion of the lock piston and at least one annular seal is mounted on the outer periphery of the large diameter portion of the lock piston and the annular seals sealing a parking release control fluid pressure chamber from opposite sides in the axial

direction are discussed at paragraph [0078] of the original specification; and, the casing bore including a slide hole having a first diameter, which slidably receives a portion of the parking piston, and a guide hole coaxially connected to the slide hole and having a second diameter which is smaller than the first diameter, the guide hole configured to slidably receive the retaining tube therein, wherein a tapered, forward-facing restricting step is formed in the casing bore between the guide hole and the slide hole is shown in Figures 4-6, and the associated discussion thereof, of the original specification.

Applicant also respectfully submits that the present amendments do not introduce any impermissible “new matter” into the application, as all of the subject matter of these amendments was expressly or inherently disclosed in the specification as originally filed.

Information Disclosure Statement

At page 2 of the Office Action, the Examiner has noted that the Information Disclosure Statement filed 19 September 2006 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because, according to the Examiner, some of the references fail to include the inventor(s) and issue date as required by 37 CFR 1.98(b)(1).

Applicant's Response

Applicant has carefully considered the Examiner's position regarding the Information Disclosure Statement filed 19 September 2006. Applicant respectfully points out that while the Examiner may be correct that some of the U.S. References listed did not include the inventor and issue date, such references were listed as a courtesy / convenience to the Examiner because they correspond to the Japanese references also listed in the IDS and effectively provide a full English translation of same. Thus, the Examiner has, in fact, considered the material contained in the references, as she has considered the Japanese reference corresponding to each of the U.S. references.

Claim Rejection – 35 USC 112

At page 2 of the Office Action, the Examiner rejected claim 1 under 35 USC 112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner states that the phrase “the guide groove” in line 4 from the bottom is indefinite. The Examiner states that in her opinion it is unclear as to which guide groove Applicant intends to refer since a plurality of guide grooves were previously recited.

Applicant’s Response

Applicant has carefully considered the Examiner’s rejection and applicant respectfully submits that, based on the above amendments to claim 1, the Examiner’s rejection and been overcome. As such, applicant respectfully requests that such rejection be reconsidered and withdrawn.

Claim Rejection – 35 USC 103

At page 3 of the Office Action, the Examiner has rejected claim 1 under 35 USC 103(a) as unpatentable over Reinecke (US 4,116,307). It is the Examiner’s position that Reinecke shows (Fig. 3) a parking brake system comprising: a parking piston (83) slidably fitted into a casing (82a, 82b) so that a parking brake state can be obtained by forward movement in response to a parking control fluid pressure acting on a rear face of the parking piston; a lock mechanism provided within the casing to the rear of the parking piston (83); a fluid pressure control source (connected to element 89); and fluid pressure control means (89); the lock mechanism comprising a lock piston (92) that is slidably fitted into the casing to the rear of the parking piston so that at least when the parking piston moves forward a forward urging force acts on the lock piston and that is arranged such that a parking release control pressure can act on the lock piston toward the rear, a cylindrical retaining tube (the rightmost

o-ring on 83), at least one sphere (90) that are retained at least one position in the peripheral direction of the retaining tube so as to be movable in the direction along the radial direction of the retaining tube, and an insertion shaft (integrally connected shaft portion to the left of 92) that is connected integrally to the front end of the lock piston so as to be axially relatively movably inserted into the retaining tube in order to sandwich the at least one sphere between the insertion shaft and the inner face of the casing while contacting the at least one sphere via intervening element from the inside of the retaining tube; the casing and insertion shaft being formed so as to position the at least one sphere radially inward when the parking piston is at a retreat limit and position the sphere radially outward when the lock piston moves to a forward position in response to forward movement of the parking piston from the retreat limit, a plurality of guide grooves (92a), having concavely curved cross-sectional shape with a diameter that is equal to or larger than the diameter of the at least one sphere so that park of each of the at least one sphere is rollably fitted into the guide groove, and the casing having provided on the inner face a restricting step or incline of 82b that is capable of abutting, from the rear, against the sphere pushed radially outward by the insertion shaft when the lock piston is at the forward position.

Applicant's Response

Applicant has carefully considered the Examiner's rejection and respectfully traverses such rejection because Reinecke fails to disclose/discuss (or make obvious) features of the claimed invention, and because the claimed invention is significantly more complex in function than that of Reinecke's invention.

Particularly in relation to claim 1, Reinecke's invention (applicant references the embodiment of the invention of Reinecke disclosed in Fig. 3, as this is the embodiment the Examiner reference's in her rejection) involves the use of an actuating device consisting of a two part annular cylinder 82a, 82b disposed between brake bands 75, 76, and an annular auxiliary brake piston 83, axially moveable

therein, sealed off by sealing rings. Between the outwardly extending faces of the piston 83 and the cylinder 82a (which define an auxiliary brake chamber 87), a filling piece/ball 90 rests on an inclined surface 92a of an auxiliary piston (locking mechanism) 92. When a parking brake valve 89 is actuated, air is supplied to the auxiliary brake chamber 87. The pressure being built up urges the annular piston against the inner face of the annular cylinder 82a, while on the other side the annular cylinder 82a moves with its brake band 75 and brake lining 77 directly against the other brake disc 70. The filling piece/ball 90 then rests loosely, or under the influence of a pushing or pulling force of a spring, on the inclined surface 92a of the auxiliary brake piston 92, since the parking brake valve 89 retains the piston 92 in a position which is not controlled by the roller 90. When parking brake actuation is terminated, the pressure in the chamber 93 is reduced so that the force of the spring 91 causes the piston 92 to move in the direction of tension and, due to the inclined face 92a, the roller 90 moves upward against the wedge shaped faces. In order to release the parking brake, air is supplied to the chamber 87 so that forces are removed from the filling piece or roller 90 and the air subsequently supplied to the chamber 93 eliminates the locked condition.

Thus, while Reinecke generally discloses a parking brake system in which a parking brake state is obtained by the forward movement of a parking piston with the rear side of a parking piston facing a parking control fluid pressure chamber and the forwardly moved state of the parking piston being mechanically locked by a locking mechanism similar to that of the claimed invention, the invention of Reinecke is much more simple in structure and lacks many of the limitations of the claimed invention. Specifically, Reinecke fails to disclose a cylindrical retaining tube that is integrally and coaxially connected to a rear part of the parking piston and (a plurality of) spheres retained around the retaining tube wherein an insertion shaft connected to the front end of the lock piston is relatively movably inserted into the retaining tube in order to sandwich the spheres between the insertion shaft and the inner face of the casing. Instead, the locking piston (92) of Reinecke (as

seen in Fig. 3) is positioned such that it is outside of and below the parking piston (83). Thus, the locking piston (92) is not retained by any portion of, or any extension of, the parking piston 83, as is required by the claimed invention.

Further, while Reinecke discloses a ball 90 used to assist in the locking and unlocking of the parking piston may be similar to one of the spheres of the claimed invention, the use of multiple spheres, as required by the claimed invention, would not be obvious, as contended by the Examiner. The single ball 90 of Reinecke is positioned between the parking piston 83 and the locking piston 92 at the only faces where the two pistons may contact. Since the two pistons of Reinecke are positioned adjacent to each other, and not positioned such that the locking piston is surrounded by the parking piston as in the claimed invention, the use of a plurality of spheres would not be necessary, and therefore unobvious.

Moreover, the Examiner's assertion that the inclined face 92a of the locking piston 92 of Reinecke teaches/makes obvious the guide grooves 125 of the claimed invention is completely unfounded. Reinecke merely states that the locking piston 92 includes an inclined face 92a upon which the roller/ball 90 moves. Reinecke never discloses or suggests that the inclined face 92a includes a groove or has a concavely curved cross-sectional shape such that the roller/ball 90 is rollably fitted into the inclined face 92a. The Examiner's assertion that the inclined face is similar to or makes obvious the guide grooves of the claimed invention is merely based on improper hindsight by the Examiner coming from the Examiner's knowledge of the present invention.

Based on the foregoing, applicant respectfully submits that the rejection of claim 1 as unpatentable over Reinecke has been overcome. As such, it is respectfully requested that such rejection be reconsidered and withdrawn.

Claim Rejections – Double Patenting

At page 6 of the Office Action, the Examiner has rejected claim 1 on the ground of

nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent Number 7,651,175 to Inagaki in view of Reinecke. It is the Examiner's position that claim 1 of the instant application and claim 1 of the '175 patent recite similar limitations except that the '175 patent claims that the guide grooves are on the inner face of the large diameter hole whereas the instant invention recites that the guide grooves are on the outer face of the insertion shaft. Further the Examiner states that the simple position of the spheres would not modify the operation of the parking brake and is therefore an unpatentable distinction.

Applicant's Response

Applicant has carefully considered the Examiner's rejection and respectfully traverses such rejection, based on the current amendments and arguments. Neither the '175 patent to Inagaki nor Reinecke teaches that guide grooves are provided on the outer face of the insertion shaft as is required by the claimed invention.

According to the claimed invention, the plurality of guide grooves extend in the axial direction of the insertion shaft 59 and are provided on the outer face of the insertion shaft 59, so that parts of the spheres 58 are rollably fitted into the guide grooves 125. The guide grooves 125 having a cross-sectional shape that is concavely curved with the radius R that is equal to or larger than the radius r of the spheres 58, and it is therefore possible to make the contact area of the spheres 58 and the insertion shaft 59 relatively large, thereby relieving the stress acting on the spheres 58 and the insertion shaft 59 when in a locked state. Due to the placement of the guide grooves 125 on the outer face of the insertion shaft 59, the lock piston 56 is inserted in a straight line with the parking piston 44, allowing the spheres to roll within the guide grooves in the same direction as the direction in which the lock piston moves. Thus, the relative rotation between the parking piston and the lock piston is restricted and the lock piston is inserted into the parking piston smoothly. (See paragraphs [0087]-[0089] of the specification).

Such features are not disclosed, suggested or rendered obvious by the '175 patent to Inagaki nor by the Reinecke disclosure. Contrary to the Examiner's assertion, as discussed above, the placement of the guide grooves on the outer face of the insertion shaft does modify the operation of the device from that of the '175 patent to Inagaki. The '175 patent to Inagaki discusses that, due to the positioning of the guide grooves on the inner face of the large diameter hole, it is possible to make the contact area of the spheres and the sleeve and the casing relatively large, thereby relieving the stress acting on the spheres, the sleeve and the casing when in a locked state. Thus, the Examiner's assertion that the spheres moving radially inward and/or outward along the guide groove whether such grooves were on the inner surface of the hole or the outer surface of the insertion shaft, does modify the operation of the device.

Based on the foregoing, applicant respectfully submits that the Examiner's rejection of claim 1 on the ground of nonstatutory obviousness-type double patenting over the '175 patent to Inagaki in view of Reinecke has been overcome. As such, it is respectfully requested that such rejection be reconsidered and withdrawn.

OTHER MATTERS

New claims 2-7 are believed to be allowable based on the foregoing arguments concerning the merits of claim 1, and based on the merits of the additional features recited in the new claims.

CONCLUSION

For all of the foregoing reasons, applicant respectfully submits that all of the objections and rejections set forth in the Office Action are overcome, and that as presently presented, all of the pending claims are believed to be allowable over all of the references of record, whether considered singly or in combination.

Accordingly, applicant requests reconsideration and withdrawal of the rejections of record, and allowance of the pending claims.

The application is now believed to be in condition of allowance, and a notice to this effect is earnestly solicited.

If the Examiner is not fully convinced of the patentability of all of the claims now in the application, the applicant respectfully requests that the Examiner telephonically contact the applicant's undersigned representative to expeditiously resolve any issues remaining in the prosecution of the application.

Favorable consideration is respectfully requested.

Respectfully submitted,



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